

# NEW INSECT GROWTH REGULATOR NOVALURON TO CONTROL LARVAL NITIDULIDAE IN STRAWBERRIES

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*Lobiopa insularis* adult and larva

## INTRODUCTION

Strawberries valued at \$327 million were produced on 3,200 ha. in Florida, during 2007-2008. Sap beetles (principally *Lobiopa insularis* and *Haptoncus luteolus*) enter fields in late winter, chew holes in ripe fruit and reproduce there. The presence of small numbers of adults or their larvae in fresh fruit can inflict significant economic damage.

## METHODS

Experiments were conducted in each of 2006, 2007, 2008 (not presented) and 2009 to determine the usefulness of aqueous sprays of novaluron, the benzoylurea inhibitor of chitin biosynthesis insecticide, for management of sap beetle larvae in strawberries. Treatments (Tables 1, 2, and 3) were replicated four times in plots of two rows of 10 plants and were applied at 934 L/ha. Sap beetle adults and larvae were counted for 5 minutes per plot. When treatment application and counting dates coincided, counting was performed before application of treatments. Data were transformed  $\sqrt{(x+0.5)}$  prior to ANOVA and significant differences among means were detected by Fisher's Protected LSD ( $P \leq 0.05$ ).

Table 1. Treatment schedule. 2009.

Treatment/ Formulation <sup>a</sup>	Rate amt/ha.	Application Interval	Date of treatment application					
			18 Feb	24 Feb	4 Mar	11 Mar	19 Mar	31 Mar
Nontreated	--	--						
Bifenthrin 10% WSB	1.68 kg	7-day	X	X	X			
Bifenthrin 10% WSB	1.68 kg	14-day	X		X		X	
Bifenthrin 10% WSB	1.68 kg	21-day	X			X		X
Novaluron 0.83 EC	0.88 L	7-day	X	X	X			
Novaluron 0.83 EC	0.88 L	14-day	X		X		X	
Novaluron 0.83 EC	0.88 L	21-day	X			X		X
Novaluron 0.83 EC	0.66 L	14-day	X		X		X	
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.66 L 1.86 kg	14-day	X		X		X	
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.88 L 1.86 kg	7-day	X	X	X			
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.88 L 1.86 kg	14-day	X		X		X	
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.88 L 1.86 kg	21-day	X			X		X
Novaluron 0.83 EC + Acetamiprid 30 SG	0.88 L 0.48 kg	14-day	X		X			
Acetamiprid 30 SG fb Novaluron 0.83 EC	0.48 kg 0.88 L	7-day	X	X		X		
Acetamiprid 30 SG fb Novaluron 0.83 EC	0.48 kg 0.88 L	14-day	X				X	X

<sup>a</sup> A '+' sign indicates the products were combined, 'fb' indicates followed by.

## RESULTS

No sap beetle larvae were found after two applications of novaluron in 2006 and 2007 (Tables 2 and 3). Almost no larvae were found after two applications of novaluron in 2009 regardless of combinations with other insecticides or the application interval (Table 4). There were no additional reductions in larvae when the period between applications of novaluron was reduced (Table 4). There was little or no impact on adult sap beetles during the observation periods attributable to novaluron (data not presented).

Table 2. Larvae after applications on 14 and 22 March, 2006.

Treatment/ Formulation	Rate amt/ha.	No. sap beetle larvae/5 min of observation		
		13 Mar	22 Mar	28 Mar
Nontreated check	--	0.00	4.00 a	9.25 a
Bifenthrin 10% WSB	1.68 kg	0.00	1.50 a	8.00 a
Bifenthrin 10% WSB + novaluron 0.83 EC + 0.88 L	1.68 kg	0.00	0.25 a	0.00 b
Novaluron 0.83 EC	0.88 L	0.00	0.00 a	0.00 b

Table 3. Larvae after applications on 5 and 12 April, 2007.

Treatment/ Formulation	Rate amt/ha.	No. sap beetle larvae/5 min of observation		
		4 Apr	11 Apr	18 Apr
Nontreated check	--	23.25 a	11.75 ab	10.50 ab
Acetamiprid 30 SG	0.29 kg	33.00 a	17.00 a	5.50 ab
Acetamiprid 30 SG	0.44 kg	31.50 a	14.25 a	4.25 b
Bifenthrin 10% WSB	1.68 kg	37.75 a	18.25 a	11.75 a
Bifenthrin 10% WSB + novaluron 0.83 EC	1.68 kg 0.88 L	29.00 a	5.50 bc	0.00 c
Novaluron 0.83 EC	0.88 L	15.75 a	2.50 c	0.00 c

Table 4. Larvae after applications indicated in Table 1. 2009.

Treatment/ Formulation <sup>a</sup>	Rate amt/ha.	Application Interval	No. sap beetle larvae/5 min of observation			Experiment Average <sup>b</sup>
			9 Mar	24 Mar	6 Apr	
Nontreated	--	--	13.3 a	15.0 a	12.5 a	11.1 a
Bifenthrin 10% WSB	1.68 kg	7-day	0.0 c	3.3 bc	6.0 ab	1.8 c
Bifenthrin 10% WSB	1.68 kg	14-day	4.0 b	5.0 b	7.8 a	4.9 b
Bifenthrin 10% WSB	1.68 kg	21-day	1.0 bc	3.5 b	10.5 a	2.8 c
Novaluron 0.83 EC	0.88 L	7-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC	0.88 L	14-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC	0.88 L	21-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC	0.66 L	14-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.66 L 1.86 kg	14-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.88 L 1.86 kg	7-day	0.0 c	0.0 c	2.3 bc	0.3 d
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.88 L 1.86 kg	14-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC + Bifenthrin 10% WSB	0.88 L 1.86 kg	21-day	0.0 c	0.0 c	0.0 c	0.0 d
Novaluron 0.83 EC + Acetamiprid 30 SG	0.88 L 0.48 kg	14-day	0.3 c	0.0 c	0.0 c	0.0 d
Acetamiprid 30 SG fb Novaluron 0.83 EC	0.48 kg 0.88 L	7-day	0.0 c	0.0 c	0.0 c	0.0 d
Acetamiprid 30 SG fb Novaluron 0.83 EC	0.48 kg 0.88 L	14-day	0.0 c	0.0 c	0.0 c	0.0 d
<i>F</i> <sub>14,42</sub>			4.43	10.99	4.21	24.60
<i>P</i> -value			<0.0001	<0.0001	<0.0001	<0.0001

<sup>a</sup> A '+' sign indicates the products were combined, 'fb' indicates followed by.

<sup>b</sup> Data are the average of all sample dates not including the pre-treatment data of 16 Feb.

## CONCLUSIONS

The insect growth regulator, novaluron, can be useful to provide control of sap beetle larvae in strawberries and additionally contribute a new mode of action to the control options. The new mode of action can enhance programs that reduce probabilities of resistance to chemical control measures.